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Leveraging digital tools to support recovery from substance use disorder during the COVID-19 pandemic response

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ABSTRACT

Treatment for substance use disorder (SUD) during the COVID-19 pandemic poses unique challenges, both due to direct effects from the illness, and indirect effects from the physical measures needed to "flatten the curve." Stress, isolation, lack of structure, limited access to physical and mental health care, and changes in treatment paradigms all increase risk of return to drug use events and pose barriers to recovery for people with SUDs. The pandemic has forced treatment providers and facilities to rapidly adapt to address these threats while redesigning their structure to accommodate physical distancing regulations. Digital health interventions can function without the need for physical proximity. Clinicians can use digital health intervention, such as telehealth, wearables, mobile applications, and other remote monitoring devices, to convert in-person care to remote-based care, and they can leverage these tools to address some of the pandemic-specific challenges to treatment. The current pandemic provides the opportunity to rapidly explore the advantages and limitations of these technologies in the care of individuals with SUD.

1. Background: substance use disorder, digital tools, and the COVID-19 pandemic

Individuals in treatment for substance use disorder (SUD) represent a particularly vulnerable population during the COVID-19 pandemic. Access to and retention in treatment were challenging even pre-COVID, and the pandemic has unique implications for the treatment of SUD. The pandemic has had tremendous economic, social, and medical impacts on the entire population, and individuals with SUD face increased risks both directly and indirectly related to the virus. These risks include increased risk of COVID-19 infection due to high rates of tobacco or vape use and densely populated living situations (Becker & Fiellin, 2020; Dunlop et al., 2020; Karamouzian et al., 2020; Volkow, 2020); and decreased or delayed access to health care due to stigma or misinterpretation of COVID-19 symptoms as drug or alcohol withdrawal (Dunlop et al., 2020). Indirect risks due to public health measures needed to "flatten the curve" include increased difficulty accessing crucial components of treatment such as specially regulated medications (i.e. methadone, buprenorphine, naltrexone), and community support structures (e.g. group therapy and anonymous 12-step programs) (Dunlop et al., 2020; Volkow, 2020). Individuals may lose access to trusted clinicians due to these clinicians' own illness or personal struggles.

Decreased access to routine mental health care also poses a risk, given the prevalence of dual diagnosis in this population and increased mental health issues associated with physical distancing (Dunlop et al., 2020; Khatri & Perrone, 2020; Shuler et al., 2017). We expect increased or return to substance use due to stress, isolation, or grief, as seen with past natural disasters and public health crises (Garfin et al., 2014; Ma & Smith, 2017; North & Pfefferbaum, 2013; Volkow, 2020; Wagner et al., 2009), and as recent surges in alcohol sales suggest (Pollard et al., 2020).

Digital health interventions—those that use technologies such as smartphones, web-based applications ("apps"), or remote monitoring sensors to facilitate health care—are particularly well-suited to support physically distanced care. In the pre-COVID-19 era, the SUD treatment field considered digital health interventions to be promising but were

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still not widely implemented and adopted. Telemedicine has demonstrated efficacy and acceptability in SUD treatment in limited research; however, methodologically rigorous studies are lacking (Lin et al., 2019). Smartphone-based digital health interventions have shown promise in reducing substance use and increasing quality of life in persons with SUD (Carreiro, Newcomb, et al., 2020). Specifically, studies have demonstrated decreased substance use in alcohol use disorder (Gustafson, 2014), cannabis use disorder (Shrier et al., 2018), and opioid use disorder (Guarino et al., 2016). Less data exists on wearable sensor-based digital health interventions for SUD; however, small studies have shown improved outcomes with transdermal alcohol sensors (Barnett et al., 2017) and interventions based on physiologic stress detection (Leonard et al., 2017).

Despite the need for ongoing rigorous research to fully understand these digital tools' potential, the rapid and unplanned implementation of physically distanced care protocols has pushed these digital tools to the forefront of treatment paradigms. Aware Recovery Care, a 52-week in-home addiction treatment program, provides treatment for all SUDs (including alcohol use disorder) to approximately 500 clients (ages 16–80 years) in four states. Aware has been incorporating technology into client care since its inception in 2011, including wearables for activity and physiology tracking/wellness, mobile apps for accountability and geolocation tracking, and online interactive client portals to enhance participation in care. We describe the experience at Aware during the COVID-19 pandemic response with a focus on digital health interventions.

2. Description of current state of services

The COVID-19 pandemic has caused a pivot to predominantly virtual-based interactions almost overnight. Clinicians who previously provided treatment at clients' homes are now mainly homebound themselves, providing care remotely. Aware has adopted multiple digital solutions to facilitate remote care, including telehealth visits and client monitoring utilizing portable sensor-based technologies.

Telehealth, while not a replacement for in-home visits, has been vital in keeping stable clients safe and engaged in treatment. Clinicians can customize each interaction depending on the client's needs. Some may find it challenging to stay engaged on a computer for their typical hour-long session, so clinicians have adapted to divide meetings into shorter blocks. Utilizing telehealth also allows clinicians to be more flexible in appointment times while still seeing their clients face-to-face, which is crucial for picking up on facial cues and body language that can be missed on audio-only calls. Additionally, relaxed regulations with regard to clinicians practicing across state lines has allowed for staffing flexibility across practice sites. We have mailed clients without a computer or Internet access a wireless communication network-enabled tablet to their home to mitigate disruption in care. Also, clients are connected to virtual 12-step meeting resources so that they can continue to build a sober peer-support network while physically distancing.

We offer current and new clients the option to participate in an ongoing clinical study to test and refine the RAE (Realize, Analyze, Engage) digital platform. RAE is an innovative mobile health (mHealth)-based intervention for individuals in treatment for SUD that combines digital diagnostics with digital therapeutics to promote sustained sobriety and recovery. The RAE system consists of: 1) a wearable device that detects digital biomarkers of substance craving and stress; 2) a mobile app that offers several levels of dialectical behavior therapy (DBT)-based interventions upon stress or craving detection or immediate connection to a clinician if the client indicates the need for help; and, 3) a clinician-facing portal to deliver actionable insights to a treatment team. Upon initial pilot testing, clients' perceptions were positive and they rated the wearable system's acceptance as high (Carreiro, Chintha, et al., 2020). We have planned for clinical trials to determine the impact on treatment outcomes and quality of life for 2021. Also, as traditional methods of monitoring progress are changing (i.e., barriers to obtaining in-person drug screens), technology provides a way to fill these gaps. We offered the RAE trial to clients pre-COVID-19, but it is especially attractive during the pandemic. Clients who cite higher levels of stress and anxiety related to COVID-19 have received the platform particularly well. We have not established the safety and/or efficacy of RAE and further investigation is needed. However, preliminary data are promising.

We provide clients with alcohol use disorder an additional digital health intervention upon admission; the SoberLink wireless breathalyzer device with facial recognition (SoberLink, Huntington Beach, CA). Clients receive text alerts prompting them to use the breathalyzer at three predetermined times throughout the day, covering a span of 12 or more hours. The device sends real-time test results to clinicians to assist in monitoring client safety and accountability. If the client does not use the device during the designated time window, their clinician receives a missed test alert, prompting follow-up.

As demonstrated in these examples, individual digital tools typically fill a specific need or complement a specific component within the SUD treatment paradigm (e.g., telehealth to make clinician visits more accessible, or physiologic event tracking from sensors to increase self-awareness). However, they also have the largely unrealized potential for integration, automation, and connectivity not available through traditional means and provide opportunities for synergy among digital interventions that will undoubtedly enhance care.

Digital tools are not without their own challenges, however. Programs need to plan for basic technology issues, such as power loss and the need for private spaces to conduct visits. When technology falls short, clinicians and clients become frustrated, which detracts from the treatment paradigm. More subtle changes to the clinician-client interaction have arisen as well. For example, seasoned clinicians who are adept at identifying behavioral cues in-person have reported these are much more difficult to detect via virtual interactions. Important behavioral cues during tele-visits are different, and these patterns require some skill and experience to identify.

Although Aware staff has become accustomed to using digital tools, the addition of new technology typically entails carefully planned training sessions over time to ensure comfort, skill, and seamless integration. This made the overnight transition to virtual care a challenge at the onset of the pandemic; training on new technology platforms had to occur using the same technology with which people were unfamiliar (i.e., training clinicians to use a telemedicine platform while using that platform to facilitate training). Interestingly, the learning curve seemed to decrease out of necessity and urgency.

While many are anxiously awaiting a return to in-person treatment, a recent anonymous quality assurance survey of Aware's clinical staff (including $N = 109$ licensed master's-level clinicians, peer support personnel, nurses, and physicians) and clients ($N = 322$) suggests that digital practices are still allowing for effective delivery of care. When asked "Is the lack of physical proximity a barrier to treating your clients?" 48% of clinicians reported "never" or "rarely" and 46% reported "sometimes." Eighty-eight percent of clients surveyed responded that remote practices were not a barrier in their treatment. When comparing the three months pre- and post-remote care implementation, the number of admissions was steady but the number of treatment suspensions (i.e., clients leaving the program prior to completion) decreased by 17%, suggesting that people are remaining engaged in care despite the virtual transition.

3. Implications for the future of SUD treatment

As the SUD treatment community transitions to a "new normal", the COVID-19 pandemic is far from over and SUD treatment providers are preparing for the inevitable downstream effects on clinicians and clients. On an individual level, clinicians will likely need trauma-informed care models to help clients adjust and work through COVID-19-related challenges as they pertain to recovery. On a systems level, rapid

uptake and utilization of telehealth and other digital health platforms is expected to occur out of necessity; clinicians and clients alike will learn to use them and gain comfort and expertise with their functionality. As a "silver lining," the COVID-19 pandemic will undoubtedly help us to better understand where digital health interventions fit (and where they fall short) in SUD treatment. Through increased use and experience, we can integrate data streams from various digital health tools to create a powerful care network that is responsive to individual needs while maximizing comfort and, in the case of a pandemic, safety of both patients and clinicians.

The COVID-19 pandemic will undoubtedly change the practice of SUD treatment for years to come; directly through ongoing limitations due to threat of infection and psychosocial stress, and indirectly through lessons learned and adaptations incorporated during these challenging times. The transient mandatory move to remote treatment protocols is expected to rapidly improve clinicians' comfort and expertise with digital health capabilities (both telehealth and mHealth) and expand their use in routine practice. To maximize the knowledge gained, clinicians and researchers should leverage this unique opportunity to collect prospective data on optimal deployment strategies, and efficacy and usability of digital health tools. While digital health tools cannot necessarily replace expert clinicians and in-person interactions, they can be robust adjuncts to provide better care to individuals in recovery (or seeking recovery) from SUD.

CRediT authorship contribution statement

Amy McDonnell: Conceptualization, Data Curation, Writing - Original Draft, Review & Editing.

Courtney MacNeill: Conceptualization, Data Curation, Writing - Original Draft Writing - Original Draft.

Brittany Chapman: Conceptualization, Writing - Original Draft, Review & Editing.

Nicole Gilbertson: Conceptualization, Funding acquisition, Writing - Review & Editing.

Megan Reinhardt: Conceptualization, Funding acquisition, Writing - Review & Editing.

Stephanie Carreiro: Funding acquisition, Supervision, Writing - Original Draft, Review & Editing.

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Declaration of competing interest

Nicole Gilbertson is the COO of REA Health and Megan Reinhardt is the CEO of RAE Health. Amy McDonnell, Courtney MacNeill, Brittany Chapman and Stephanie Carreiro have nothing to disclose.

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